

# Calculating Integrated Pollution Indices for Heavy Metals in Ecological Geochemistry Assessment Near Sugar Mill

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**ABSTRACT:**

The sugar mill is a good example of a site where human pressures and ecological values collide with each other. One of the aims of this work was to select different types of index to aggregate and assess heavy metal contamination near sugar mill in an accessible manner. Concentrations of heavy metals (Iron, Manganese, Zinc and Copper) are studied in the soil near sugar mill to assess metal contamination due to industrialization. The soil samples were collected from three different depths A (0 cm), B (5 cm) and C (10 cm) for a period between October 2010 and March 2011 (winter and summer) and the heavy metal contents were analyzed by Atomic Absorption Spectrophotometer. Pollution index is a powerful tool for ecological geochemistry assessment. Nine integrated indices were divided into two groups. One group is suitable for the normal distribution single indices including the average, vector modulus, and Nemerow pollution indices, and the other for log-normal distribution including the product, root of the product, and weighted power product pollution indices. Using background levels as reference values, five contamination classes were divided, and the terminologies are suggested for the integrated indices to unify the assessment results. The pollution load index (Ecological risk index) indicates that soil near sugar mill was highly polluted due to heavy metals ( $PLI_{Fe} = 0.30$ ,  $PLI_{Mn} = 0.58$ ,  $PLI_{Zn} = 0.24$  and  $PLI_{Cu} = 0.34$ ). The results of contamination index, index for chemistry and metal pollution were in agreement with pollution load index. Average and vector modulus of pollution index and Nemerow pollution index indicated slightly polluted domain. Since the aim of work on contamination evaluation is to assess the overall contamination of a study area, the indices are highly appropriate.

**Keywords:**

Atomic Absorption Spectrophotometer, integrated indices, pollution index, heavy metals, ecological risk index, Nemerow pollution index.